

## REMARKS

### *Preliminary Remarks*

The Non-Final Office Action of March 17, 2005 has been received and analyzed. Claims 1-15 are active and pending. No amendments are made to the claims, specification, or drawings at this time.

The Applicants do not agree that any of the cited references alone or in combination anticipate or teach, disclose, or suggest every feature recited in the pending claims. Instead, the Applicants respectfully submit that claims 1-15 distinguish from and are allowable over any of the cited references, whether alone or in combination.

### **35 U.S.C. § 102 Rejection**

Claims 1, 2, 4-6, 10-11, and 15 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U. S. Patent No. 6,645,402 to Kurokawa ("Kurokawa"). This rejection is respectfully traversed.

The position maintained by the Examiner throughout the prosecution of this application is set forth at paragraph 7 at page 9 of this Office Action:

The Examiner asserts that as clearly shown in Figure 4, the emitter surface treatment agent of 20 cc of a solution obtained by diluting isobutyl methacrylate with butyl carbitol along with organic material is deposited on the substrate (1) and covers the emitter (3). Even though, emitter surface treatment agent of 20 cc of a solution ..... along with organic material (6) and the emitter (3) are deposited at the same time. However, Applicant merely claims the emitter surface treatment agent cover [sic] the emitter and does not differentiate the timing of the deposition of [sic] emitter and emitter surface agent. Furthermore, [sic] clearly shown in Figure 4, emitter (3) is embedded within the emitter surface treatment agent of 20 cc of a solution obtained by diluting isobutyl methacrylate with butyl carbitol along with organic material (6) and thus the emitter is covered by the surface agent.

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Moreover, because Kurokawa does not use the term "emitter surface treatment agent", the Examiner further explains at page 10 of this Office Action that:

...if the organic material turns into a carbide and bonds the graphite particle or the emitter to the surface of the cathode, *it is inherent that* the organic material or carbide "treats the surface" of the emitter and the cathode in order to bond the two surfaces together. Thus, the Examiner *interprets* that the organic material 6 is part of a surface treatment agent. (Emphasis Added).

The Applicants respectfully disagree with this position on several grounds: 1) Kurokawa does not expressly or inherently describe each and every element as set forth in the claims; and 2) the claims clearly differentiate the timing of the deposition of the emitter and emitter surface treatment agent.

***Kurokawa does not expressly or inherently describe each and every element as set forth in either claim 1 or claim 10.***

It is respectfully submitted that each and every feature of claim 1 and claim 10 is not expressly or inherently described in Kurokawa. Additionally, it is respectfully submitted that contrary to MPEP 2131, Kurokawa does not show "the identical invention ... in as complete detail as is contained in the claims," and that the elements disclosed by Kurokawa are not arranged as required by claim 1 or by claim 10.

For example, claim 1 recites separate steps of:

...forming an emitter having a carbon-based material on the cathode electrode;

depositing an emitter surface treatment agent on the substrate to cover the emitter;

hardening the emitter surface treatment agent; and

removing the hardened emitter surface treatment agent ....

Similarly, claim 10 recites separate steps of:

...forming an emitter including a carbon-based material;  
forming a surface treatment agent over the emitter;  
heating the surface treatment agent for forming a treatment film;  
and  
removing at least a portion of the treatment film.

In contrast, Kurokawa discloses separate steps of:

mixing "400 mg of graphite particles ... into 20 cc of a solution ...,"  
applying the "resultant solution to the chromium electrode 2 by a spinner...,"  
leaving the coated electrode in a "300° C atmosphere for 1 hour to be dried,"  
exposing "a surface of the electrode having the graphite particles 3 applied thereto ... to a hydrogen plasma 7 to remove the organic material 6 remaining on a surface of the graphite material 3." See Col 8, lines 52 to Col. 9. lines 1-3.

Moreover, as described at Kurokawa, Col 8, lines 61-64,

...reference numeral 6 represents an organic material contained in the solution in which the graphite particles 3 were dispersed.

As further described at and Col. 9, lines 4-11:

...a part of the organic material 6 exposed to the plasma 7 is decomposed and thus removed, and another part of the organic material 6 positioned between the graphite particles 3 and the chromium electrode 2 is carbonized into a carbide 8 ... and remains after the treatment. This carbide 8 fixes the graphite particle 3 to the chromium electrode 2.

Thus, Kurokawa differs from the features recited in claim 1 and in claim 10 in at least the following respects. As discussed further below, the claimed invention first forms the emitter on a cathode and then deposits a surface treatment agent, which is heated and then removed.

Kirowa, in contrast, simultaneously deposits i) graphite emitter particles (3), ii) 20 cc isobutyl

methacrylate/butyl carbitol solution, **and** iii) organic material (6) onto an electrode.

Consequently, even if either of the 20 cc solution or the organic material (6) could be considered an "emitter surface treatment agent", these materials are applied simultaneously with the graphite emitter particles, and not subsequently as required by the features of claims 1 and 10.

For at least these reasons, claims 1 and 10 are allowable over Kurokawa.

Claims 2, 4-6, and 11-15 are also allowable over Kurokawa by virtue of their dependencies on allowable base claims 1 and 10. Accordingly, the rejection of claims 1, 2, 4-6, and 10-15 should be withdrawn.

***Claims 1 and 10 differentiate the timing of the deposition of the emitter and emitter surface treatment agent.***

The Applicants respectfully submit that the timing of the deposition of the emitter and emitter surface treatment agent are inherent in claims 1 and 10 as written. For example, both claims recite separate steps for forming the emitter and depositing (or forming) the emitter surface agent. If the emitter were included in (or deposited simultaneously with) the emitter surface agent as Kurokawa describes, the claimed features of "depositing an emitter surface treatment agent on the substrate to cover the emitter" (Claim 1) and "forming a surface treatment agent over the emitter" (Claim 10) would be superfluous. Moreover, Applicant's specification states in pertinent part:

After the emitters 12 are formed through the above-described process as shown in FIG. 2a, a process for treating the surface of the emitters 12 is performed. See, page 7, lines 8 - 9.

For at least these reasons, claims 1 and 10 are allowable over Kurokawa.

Claims 2, 4-6, and 11-15 are also allowable over Kurokawa by virtue of their dependencies on allowable base claims 1 and 10. Accordingly, the rejection of claims 1, 2, 4-6, and 10-15 should be withdrawn.

### **35 U.S.C. § 103 Rejections**

Claims 1-4 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,436,221 to Chang ("Chang") in view of Kurokawa. This rejection is respectfully traversed.

First, the Examiner admits at page 5 of this Office Action that Chang fails to disclose at least "the step of hardening the surface treatment agent, as Chang's surface treatment agent is already hardened before deposition". Moreover, Chang fails to cure the deficiencies of Kurokawa that were noted above. Thus, whether or not a motivation existed to combine these references, the resultant combination would not teach, disclose, or suggest each and every feature as recited in allowable base claim 1. Thus, claim 1 is allowable over the combination of Chang and Kurokawa.

Claims 2-4 and 8 are also allowable over the combination of Chang and Kurokawa by virtue of their dependencies on allowable base claim 1. Accordingly, the rejection of these claims should be withdrawn.

The rejections of claims 7, 9, and 12-14 under 35 U.S.C. 103(a) over Kurokawa in view of U.S. Patent No. 6,623,720 to Howard and U.S. Patent No. 6,013,238 to Murata are also traversed. Claims 7 and 9 are allowable over the combination of Kurokawa and Howard by virtue of their dependencies on allowable base claim 1, which as described above, recites at least one feature not described by Kurokawa. Howard does not cure this deficiency. Claims 12-14 are allowable over the combination of Kurokawa and Murata by virtue of their

dependencies on allowable base claim 10, which as described above, recites at least one feature not described by Kurokawa. Murata does not cure this deficiency. Accordingly the rejection of claims 7-9 and 12-14 should be withdrawn.


For the above reasons, the Applicants believe Claims 1-15 are in condition for allowance, and notification of the same is respectfully requested.

### CONCLUSIONS

The Applicants submit that a full and complete response has been made to the pending Office Action and respectfully submit that all of the stated grounds for rejection have been overcome or rendered moot. Accordingly, Applicants respectfully submit that all pending claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is thus respectfully requested to pass the above application to issue.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact the Applicants' undersigned representative at the number below to expedite prosecution. Prompt and favorable consideration of this Reply is respectfully requested. Applicants respectfully request that a timely Notice of Allowance be issued for this application.

Respectfully submitted,

  
Hae-Chan Park  
Reg. No. 50,114

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**McGuireWoods LLP**  
1750 Tysons Boulevard  
Suite 1800  
McLean, VA 22102-4215  
Tel: 703-712-5365  
Fax: 703-712-5280

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